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CRITERION PROBLEMS AND CURRICULUM EVALUATION.

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THE EVALUATION OR DEVALUATION OF CURRICULUMS REQUIRES THE VALIDATION OR INVALIDATION OF THEORY AND IS NOT DETERMINED BY PHILOSOPHICAL DISPUTE. AS LONG AS A CURRICULUM IS CONSIDERED TO BE A CLOSED INFORMATIONAL SYSTEM, INTERNAL CRITERIA MAY HELP ITS SEQUENCE AND ESTABLISH ITS CONSISTENCY BUT CANNOT VALIDATE IT. TO EVALUATE A CLOSED INFORMATIONAL SYSTEM, THE RELEVANT INFORMATION WHICH PREVAILS OUTSIDE THE SYSTEM MUST BE DETERMINED AND TESTED AGAINST THAT WHICH PREVAILS INSIDE, AND ITEMS WITHIN MAY THEN BE DISPLACED OR RETAINED. THE OUTSIDE INFORMATION REPRESENTS AN EXTERNAL CRITERION OF THE INSIDE INFORMATION. OTHER CRITERION PROBLEMS SUGGEST MODIFYING THE CONCEPT THAT A CONTROL GROUP MUST BE A NAIVE PLACEBO GROUP, AND REEXAMINING STATISTICAL DECISIONS SUCH AS WHAT CONSTITUTES ADEQUATE EVIDENCE OF THE IMPACT OF THE CURRICULUM. WITH CURRICULUMS IN VARIOUS STATES OF TRANSITION, INCLUDING CHANGING METHODOLOGY, ADOPTING NEW OBJECTIVES, AND INCORPORATING NEW INFORMATION, THE PROBLEM BECOMES ONE OF EVALUATING AN OPEN AND DYNAMIC SYSTEM. HERE, THE FIRST PROBLEM IS TO DETERMINE THE BOUNDARIES, NOT BY DEFINING CHRONOLOGICAL AGE, BUT BY CREATING SOME OPERATIONAL DEFINITION OF VOCATIONAL ASPIRATIONS. LONGITUDINAL STUDIES ENTAILING BOTH THE PREDICTION AND ASSESSMENT OF CHANGE, INDEPENDENT OF EACH OTHER, ARE NECESSARY FOR SUCH CURRICULUM EVALUATION. THIS WILL PRODUCE CRITERIA FOR STABILITY AND CHANGE. RESPONSES TO THE PAPER BY RALPH E. MASON AND ROBERT M. WASSON ARE INCLUDED. THIS PAPER WAS DELIVERED AT THE NATIONAL SEMINAR FOR RESEARCH IN VOCATIONAL EDUCATION (URBANA, ILLINOIS, MAY 16-20, 1966). (EM)

Criterion Problems and Curriculum Evaluation

by Donald Leton

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responses by
Anderson, Mason, Wasson

Regional Seminar on Curriculum Evaluation in Vocational Education
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Criterion Problems in Curriculum Research

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One day, about 160 years ago, the French mathematician Laplace (1812) computed the probability that the sun would rise on the following day. Based on his assumption that the earth was created about 5,000 years previously, and that the sun had risen for 1,826,230 consecutive days, he was able to arrive at a finite probability that the sun would rise again the following day! Many years from now an educational historian very likely will review the educational events of our times. He will uncover a veritable mountain of writings from books, journals, convention programs, seminars, colloguia and symposia. In viewing the surface of this mass he might be led to the conclusion that education in the 20th century was a very complex, thorough and scientific discipline. When he proceeds however to analyze the concepts contained in all these documents he will find a great deal of repetition. In fact, if he were to classify the ideas that had been repeatedly professed and expounded up to May 16, 1966, and weigh their redundancy in the literature, then his prediction would obviously be that the sun will rise and set today on the same ideas that prevailed yesterday. The probability that an educator will express a new idea today which might move this mass, or even give it a different orientation, is very remote. And tomorrow this paper also will be only a small conglomerate in the same mass. If in reading this paper, or in attending this seminar you are

expecting to learn new concepts, or new ideas which might potentially revolutionize vocational education then you may be disappointed. These preliminary comments are not just an apology; they are also intended to describe the nature of our discipline. Whether we consider the schools in our nation, in European nations, or even in the underdeveloped nations in the process of installing educational systems, we find within them an amazing perseverance of yesterday's practice.

It's not the intention of this paper to devaluate the stability of curricula, nor is there much that can be said in its praise. The purpose of the illustration is to create an appreciation for a difficult problem in curriculum evaluation, that of innovation. Perhaps a better appreciation of this phenomenon is expressed in a limerick composed by a friend, Nolan C. Kearney, who was a very serious curriculum scholar.

There once was a teacher named Flo
Thought progress exceedingly slow!
She was stuck in a rut
Clean up to her butt
In the morass of status and quo.

And so the problem is defined. The curriculum is identified as an obdurate structure, bound by the habit patterns of many persons. There are educators who teach the same concepts and profess the same ideas as were taught generations ago. There are administrators who attend the same service clubs and carry out the same kind of situational management as their predecessors. There are the local P.T.A.'s or other parent groups that generally declare their support of schools and their confidence in school policies. Occasionally some parent groups become apprehensive that the traditional values of the 3 R's and other academic standards might be lost because of modern innovations. They may even become reactionary and request

that the previous curriculum be restored! Whether they petition for a change, or for maintenance of the status quo, they seem to have little impact on the day-by-day affairs of the school.

There are the school architects who draw the same four walls and corridors. There are the teachers whose courage for change is somewhat exceeded by the security of time-tested practice and well-charted courses. And there are also the curriculum supervisors. Their mode of functioning has been to mimeograph and distribute the curriculum "guides" that are soon shelved in a department office or a curriculum library.

Perhaps this description is not entirely accurate. It may sound unfair to modern education. To the extent that it is accurate, however, it defines the curriculum as a very stable phenomenon within a closed system.

Have educational researchers ever considered how to evaluate a stable phenomenon in a closed system? Have we ever faced this task? Later in this paper the curriculum will also be described as a very dynamic process in an open system; and the contingent evaluation problems will be reviewed. But, for the moment, let us consider the traditional in vocational education. The social utility and economic value of vocational education represent two important philosophical bases. Since these are philosophical they can be challenged by the Socratic philosophy of the personality development and cognitive shaping of the student. In contrast to this, the use of instructional models and of imitation learning in apprentice training are characteristic of traditional vocational education and they can be readily defended on philosophical as well as psychological grounds. Philosophical debates, however, will never establish the validity of curricula. The philosophy of liberal and general education may challenge vocational education;

and the cultural and technological advances may stress it, but the choice of philosophical values in education is always open to debate; and generally the strongest voice wins.

The evaluation or devaluation of curricula requires the validation or invalidation of theory and is not determined by philosophical dispute. There is as much need for theoretical grounding of vocational education as there is for other school curricula. One of the popular theories about curricula is that they represent informational systems. Unfortunately the limitations of this theory are not generally recognized as yet. Presume that a sequence of courses, e.g., the courses to become an electrician or an electronics technician, are established on the basis of informational theory. The teachers convey information, the textbooks contain information, the blackboards convey information, and the student acquires information. The acquisition of that information identifies him as an electrician. He may even take state board examinations which test for the amount of information from that curriculum. As long as that curriculum is a closed system, then the information within it is both necessary and sufficient. There is no way of discarding any which may be obsolete, superfluous, or inaccurate. Internal criteria may help to sequence the information within the curriculum and may also establish its consistency, but it can not validate it.

In order for educational research to qualify as research it requires that a theory may be either refuted or confirmed. To evaluate a closed informational system the relevant information which prevails outside the system must be determined and tested against that within it. Items of information within the boundaries of the curriculum may then be displaced, or they may survive. The value of the information outside the system

represents an external criterion of that within it.

The following syllogism illustrates the problem of evaluating a closed system:

1. The best vocational educators employed in Wisconsin are graduates of Stout Institute.

2. Most of the vocational educators employed in Wisconsin are graduates of Stout Institute.

Therefore Wisconsin employs most of the best vocational educators.

Some of you may have already decided that the conclusion is false. What we need to recognize, however, is that on the basis of the information given the truth or falsity of the conclusion can not be proven.

Perhaps you may ask for the relevance of this for curriculum evaluation. Several years ago I had the privilege of working with Guy Buswell on an evaluation of two methods of teaching reading (1964). In spite of the fact that the methods were theoretically quite distinct the reading achievement of the pupils taught under the two methods was not significantly different. As the applications of the two methods were observed in classrooms, it became apparent that they did not result in uniquely different programs. The theoretical formulation of the methods was studied and interpreted by teachers on the basis of their concepts and their judgments about the teaching of reading. These were then effected in classroom practice and finally culminated in pupil experiences. The variation in classroom practices among the teachers in a given method was far greater than the variation between the two methods. What originated as a curriculum study eventuated with the assessment of pupil achievement occurring under similar classroom experiences.

The study of the complex relationships between student learners and their curricula is in its infancy, both theoretically and empirically. In its theoretical beginnings only a few concepts relating the two have been identified. Examples of these would be Piaget's theories of conceptual and quantitative development (Flavell, 1963), and Gagné's (1962) theory of hierarchical behavior performances. The validation of concepts from theory requires that the researcher operates on both the theory and empirical level. At the empirical level the researcher faces a decision as to what constitutes adequate evidence of the influence of the curriculum on the individual.

Perhaps at this point it might be well to consider the types of criterion problems which are met in educational research. In discussing the informational content of the electrician's curriculum the need for an external criterion for validating the content was illustrated. A second criterion problem pertains to criterion groups. In the usual design of experiments individuals are randomly assigned to either a treatment or a control group. A number of researchers (Cronbach 1964, McKeachie 1963) have argued that control groups have limited value. These arguments are based on the assumption that students and teachers are usually aware of their experimental or control group membership and then may extend personal energies beyond normal performance to affect the outcomes. On the other hand most researchers recognize that discarding the control-group design and reverting to a single experimental group, pre- and posttest design, present a greater hazard of erroneous conclusions. It is probably better to modify the concept that a control group must be a naive placebo group.

Criterion groups can also be subgroups of students which differ from

each other on known characteristics. As such they are not representative of the entire population but rather of only a specified segment in which particular effects might be hypothesized, e.g., girls vs. boys, bright vs. average, etc. The knowledge gained from assessing the effects of curricula on criterion groups may be of much greater value than assessing its effects on a heterogeneous group representative of the population. The subsequent job performance of various types of students can also be a criterion of the interaction between curricula and students.

The next type of criterion problem which needs consideration in curriculum research is the statistical criterion. The question as to what constitutes adequate evidence of the impact of the curriculum is one example of a statistical decision.

In one curriculum experiment the students in an experimental curriculum achieved as well on a posttest as did the students in the traditional curriculum. If the experiment had ended there, then any decision about the superiority of either curriculum would have to be suspended, or be based on prior evidence. A factor analysis of the criterion test however, revealed that the achievement should not have been regarded as a single dimension; it contained four dimensions. The traditional students were superior on one or two of the dimensions, for example, subject information; and the experimental students were superior in another dimension, e.g., concept mastery. The statistical test of composite achievement led to the conclusion of equivalent levels. The analysis of the criterion instrument, however, led to the conclusion that the curricula resulted in different types of achievement. At this point we should add that neither of these statistical conclusions valuate or devaluate the curricula. Since the

experiment was initially designed to test for the superiority of composite achievement the factor analytic information about the types of achievement was secondary. Some of the curriculum sellers and the curriculum consumers might choose certain types of outcomes as being more valuable. This, however, should be recognized as subjective preference rather than curriculum science. Scientific procedures require that concept mastery and subject information be further tested against later criteria, for example, job performance.

Curriculum research has typically studied the effects of educational programs using significance tests on the mean differences appearing in posttests. Practical limitations have generally precluded the use of extensive variance and covariance designs. The possibility of sequential analysis, using small samples of students within a local curriculum, for decisions about minor effects should be considered. Although a number of educational researchers question the usefulness of true experimental designs for curriculum problems, nevertheless, the definitive answers in validating curricula procedures must be reached through such designs.

It appears however that, at the present stage of development in educational research, adequate definitions of curriculum variables, curriculum objectives, and student characteristics are not available. Hence they cannot provide a guide for disciplined and relevant research. For this reason more extensive use of multivariate analyses, such as factor analysis, canonical correlation, and discriminant analysis, is recommended to help identify pertinent variables and theoretical constructs. For example, a curriculum developer may aspire to objectives such as problem solving, scholarly interests, and motivation. These represent a wide array of

student behavior. Before such outcomes can be ascertained in curricula they need to be defined in terms of their simple components and correlates. The multivariate procedures referred to can serve in the analyses of complex variation within teachers, curricula and students and of the complex relationships among them.

A conspicuous aspect of recent educational theory has become identified as instructional theory. This term does not indicate an integrated system of scientific axioms and theorems, not even to the degree of other theories in education. Many educators would regard instructional theory as inseparable from learning theory and place them both within curriculum theory. Others may be more inclined to annex instructional theory to curriculum theory and thereby justify the usual linkage of curriculum with instructional functions. Instructional theory consists of a type of inquiry, and although it might now be difficult to establish its boundaries among other educational theories, it seems to be identified with detailed questions rather than with definitive answers.

The scientific discipline of education has, for the greatest period of its history, managed without instructional theory and did not feel its lack. The present generation of instruction researchers are largely engaged in eliciting brief verbal or performance responses, e.g., key pressing, in student subjects whose sensory attention is being controlled by particular kinds of visual and auditory stimuli. Passing attention is sometimes given to motivation variables in this research, but generally the artificial motivation which is generated by verbal directions and mechanical devices, especially when these represent a diversion from the usual classroom instruction, is accepted as part of the instructional stimuli. The approach has

been to modify the broad concepts of curriculum and to substitute a more restricted concept of instruction. It is apparent, however, that instructional research is the application of stimulus-response psychology to the field of education. Important as this approach may have been in the history of psychology, the same limitations which it held for the study of general behavior are now apparent in the study of school learning. It appears that instructional theory and its related technology will fall short of the educators' expectations because it does not deal with the response domain of broad educational objectives.

Previously in this paper the curriculum was described as a stable system, and relatively closed to external influence. Validating the informational content of such a curriculum was illustrated by establishing an external criterion of information. Such a curriculum might also be evaluated through descriptive and manipulative procedures. Variables within the curriculum such as the number of hours in shop application, the amount of homework, or the number of students per class can be manipulated until they produce a demonstrable effect. In such studies the internal variable changes must be maintained until a reliable description of the generated effects can be made. Many curriculum developers, however, resist the internal manipulation of variables with the view that all the relevant elements should adhere in a unified organizational structure and that the effects on students are due to the total influence of the curriculum rather than its separate elements.

Students may also be shifted from one stable curriculum to another. Shifting students from one curriculum to another, however, produces other research hazards. For example, the student-effects from the first curriculum

may not be reversible by the second. Another possibility is that the end result of the second curriculum is due to the cumulative or combined effects of both placements, i.e., the curricula are interactive rather than independent.

There is fairly consistent evidence that a student's previous educational history is a more important determinant of his future performance than are his present aptitudes. This seems to indicate that the student also functions as a stable system. Unfortunately many new curricula are being developed with the philosophical principle of educational reductionism. This principle holds that a student's characteristics are entirely determined by the experiences he has had, or will have, in his curricula. This can be constrasted with one of the principles of progressive education. For example, Rugg's interest-centered classroom is based on the principle that the curriculum is or should be determined by the student's characteristics; in this case his interests. It is not my intention to debate the contrasting philosophical principles but rather to refer to the orientations which they bring to curriculum theory and to the subsequent research. Curriculum evaluation must consider the stability and modifiability of the student to accomplish its purpose. Many of the dynamic qualities of adolescents and youth, for example, are not adequately known for controlled research in vocational education. Vocational aspiration and vocational interests may be regarded as either an input or an outcome of vocational curricula. The interaction between personality traits and vocational interests, and determinants of vocational choice are only in the theory stage (Super et al 1963). Intellectual maturity in terms of vocational aptitudes may be presumed for incoming vocational students, or may be challenged and tested

by the curriculum itself.

Since World War II the education profession has roused itself to face the picture of its own stagnation and obsolescence. Perhaps it would be more accurate to state that the press of national and world affairs has forced a confrontation of educators with outmoded curricula. One of the outcomes of this in vocational education has been the development of retraining programs.

Unfortunately when academicians in the subject matter fields became aware of the problem they hurriedly developed a wide variety of programs and materials; and the federal government has spent millions of dollars in implementing these in the public schools without any orderly and systematic procedures for evaluation. The need for evaluation has only been a recent hindsight. In fact professional educators have not as yet identified the manner in which traditional curricula were outmoded; nor the scope of their inadequacy. A curriculum can be identified as outmoded when its theories, methods, and content are less effective in producing acceptable outcomes than are other available curricula.

In some school systems there have been wholesale changes without regard for teacher preparation or for possible student effects. The modern curricula were characterized by reorganization of the content and by modification of its presentation. Curriculum administrators recognized that a good way to avoid public criticism was to change; and changes were made solely for the sake of change. Teachers who were teachers of the "modern math" or the modern science assumed an exalted status among their peers, without any real consideration of their effectiveness. High schools presented the modern curricula without foreseeing the disadvantages its

students would eventually face in college entrance examinations and in traditional college courses.

In a relatively short period of time the closed system of education was open to influences from political systems, e.g., the federal government; from social systems and their representative organizational groups; and from the economic system, with revolutionary changes in industry and business producing drastic changes in manpower and training needs.

Internal changes also produced dynamic and unstable curricula. Changes in teaching methodology, instructional materials and procedures, grading practices, and curriculum "standards" were concurrent with other changes.

Perhaps it would be more accurate then to define education as a number of systems in transition states. The student is in transition from childhood to adulthood. His cognitive abilities are in various stages of maturity and immaturity. His social attitudes and personal characteristics show day-to-day fluctuations as well as progressive developmental states.

The curricula are in various states of transition from yesterday's practices to tomorrow's expectancies. Changes are seen in teaching methdology, in the incorporation of new information and in the adoption of new objectives. Whether we accept such states as desirable or undesirable is irrelevant; the major question is how they are to be evaluated. Inasmuch as they are transitional they may also be expected to show some cyclic backwash, and irregular variability.

The first problem in studying a dynamic state is to determine its boundaries. To illustrate this for vocational education we might regard adolescents and youth as being in a transitional state in terms of their vocational aspirations. The boundaries of this state are not necessarily

defined by chronological ages, but rather by some operational definition of vocational aspirations. Aspects of vocational guidance and vocational curricula may then be set to correspond to these boundaries.

We might also view vocational curricula as being in a state of transition. The boundary of the need for blacksmiths in the horse and buggy days was defined by the mass production of automobiles. The subsequent need for auto mechanics has now been supplemented by the need for jet mechanics. Technicians who are in such great demand for defense and defense-related industries today may soon require retraining for peacetime applications of their skills. The present curricula for industrial technicians may be made obsolete by a future demand for space technicians. Perhaps curriculum developers should endeavor to foresee such changes and develop evaluation plans prior to wholesale revisions.

We might also ask at what point does a curriculum change from transitional to stable? The quantification of curricular change is definable by rates of changes among teachers and by variation in successive groups of students. For some teachers there may be little or no course revision after the second time he offers it. Such a point in transition may be identified by successive measures of student outcomes. The dynamic and open features of curricula may only be intermittent and show a system lag to historical events and to social pressures for change. Obviously, longitudinal studies which entail both the prediction and the assessment of change, independent of each other, are necessary for such curriculum evaluations.

In summary this paper has been written to try to convey some of the problems in curriculum research. The need for theoretical constructs

relating curriculum variables to student outcomes was pointed out. Examples of external and internal criteria, the use of criterion groups, statistical criteria, and criteria for stability and change were given. Curricula were described as stable closed systems and as open transition states. Procedures for the evaluation of these for the future engineering of education were suggested.

References

Cronbach, L. J. "Evaluation for Course Improvement," Chapt 12 in New Curricula, edited by Heath, R. W., Harper & Row, New York, 1964.

Flavell, J. H. The Developmental Psychology of Jean Piaget, Nostrand Inc., Princeton, N. J., 1963.

Gagnè, R. M. et al., Psychological Monographs, Vol. 76, No. 7, 1962.

McKeachie, W. J. "Problems and Perils in Controlled Research in Teaching." In E. R. Steinberg (Ed.) Needed Research in the Teaching of English, Washington: U. S. Office of Education, 1963.

Pierre, Simon de Laplace "A Philosophical Essay on Probability," Chap III, Paris: French Academy, 1812.

Super, D. E. et al., Career Development: Self Concept Theory, New York: College Entrance Examination Board, 1963.

CRITERION PROBLEMS IN CURRICULUM RESEARCH

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The need for curricular innovation and evaluation in vocational education as pointed up in Dr. Leton's paper deserves our attention and concerted efforts. Supervisors and educators are working overtime to implement new programs making use of the project method (called in-school in some states and intensive laboratory in others) and/or the cooperative method of instruction as capstone educational offerings to programs of instruction in our various vocational areas. The development of new programs under the impetus of the Vocational Education Act of 1963 is just now gathering momentum. These prospects of development and growth call for reflection and evaluation.

Dr. Leton observes that a curriculum can be identified as outmoded when its theories, methods, and content are less effective in producing acceptable outcomes than are other available curricula. Our research must investigate these other available curricula and at the same time evaluate our existing curricula.

What better criteria might be used for this evaluation and research than the sixteen fundamental principles of quality vocational education as set forth by Prosser and Quigley.[1] These same underlying principles still pertain. They are not outmoded by the passage of time.

For example, vocational education will continue to be efficient in proportion as the environment in which the learner is trained is a replica of the environment in which he subsequently must work. Vocational education

will be effective in proportion as it trains the individual directly and specifically in the thinking habits and the manipulative habits required in the occupation itself. And, it must be realized that every occupation has a body of content which is peculiar to that occupation and which practically has no functioning value in any other occupation. But, there are commonalities among related occupations within job clusters. And, there are certain commonalities among related occupations for which the various disciplines in vocational education may well discover ways of sharing their particular know-how in these areas with other vocational disciplines.

Business and distributive education are striving to determine the elements of skills, knowledges, and understandings common to most of the business occupations in order to assure that curricular offerings include these basic elements. The extent to which these common elements can be found and taught will determine the degree to which training can be supplied for clusters of occupations to assist in preparing students for mobility in related occupations. The underlying elements of management, marketing, recording, and information processing skills involved in business occupations must be taught to students having career objectives in business occupations. Many students with career objectives in business occupations are located in business or distributive curricula. Other students with career objectives in business occupations are located in home economics, industrial education, or agricultural curricula, where the technologies of these areas are so important to the understanding of

product information and the successful dealing with customers. How can vocational educators best serve these students by sharing program offerings, teaching specialties, and technological know-how?

When the principles of vocational education referred to above are translated into a cooperative method approach to instruction a certain pattern emerges. At the moment, certain elements are considered essential for a successful cooperative program. Essentially, the cooperative plan of vocational instruction uses the work situation as a "school laboratory" in which occupational competencies are developed through supervised occupational experiences while related instruction is given in school. The cooperative plan actually represents a tripartite instructional situation. Thinking of the various psychomotor, cognitive, and attitudinal learning which go to make up the package of competencies required in any given occupation:

1. Some are learned solely in school in the related class and applied on the job.
2. Some are learned solely on the job.
3. Some are learned partially in school and partially on the job.

In addition, the career objectives of the student make it mandatory that certain things, such as how to train and how to supervise, be learned in school even though they are not required in the student's training station job. Further, the cooperative plan also gives emphasis to discussion in school of problem situations encountered on the job, such as human relations involving how to benefit from supervision and constructive critism.

In order to carry out the vocational instruction function just described, the cooperative plan involves the following elements, as far as we know now:

1. Related instruction in school.
   a. Basic related instructions
   b. Specific related instruction.
2. Selected training station.
3. Student-learner with a career objective.
4. Preparatory curriculum.
5. Step-by-step training plan.
6. Adequate on-the-job supervision.
7. A qualified teacher-coordinator.
8. Adequate coordination time.
9. Suitable classroom facilities and instructional materials.
10. Well defined school policies regarding the program.
11. Well organized program records.
12. Use of an advisory committee.

Our best cooperative programs have been evaluated up to now on the basis of the extent to which these elements have been perfected and the extent to which graduates have been placed in and have been successful in the occupations for which they have been trained. Are there other important elements to be considered? Are certain of these elements superfluous?

The in-school laboratory method of teaching for office occupations, home economics, industrial education, and agriculture has been used for some time. However, too often these curricular offerings are considered isolated courses. New approaches emphasize a program approach with the intensive laboratory, as well as the cooperative arrangement, becomes the capstone to a series of prescribed courses and experiences. In business education, advanced level regular business and distributive subjects may provide for intensive experience through the medium of a laboratory not only in which exercise and problems involving the application of knowledges and skills will be an integral part of the learning experience, but also, in which the instruction will center upon the performance of production tasks on actual work projects which are brought into the laboratory.

Programs terminating with instruction in the intensive laboratory include a planned sequence of courses and make specific provisions for the following minimums:

1. Satisfactory development of basic business and economic competencies so necessary for entering and being successful in business occupationa.
2. An understanding of business principles which includes the theory, principles, and practices of administration and operation.
3. Instruction in background business and economic information essential to employment.

4. Development of skills sufficient to indicate an aptitude for and an interest in pursuing the intensive training of the laboratory.
5. Practical applications of skills, knowledges, and techniques requisite to success and advancement in the enrollee's career objective. Relevant integrating experiences are provided through the intensive laboratory.

Are these the most important minimums? Are there others? Is the intensive laboratory approach to occupational preparation just as effective or more effective than the cooperative method? Is the cooperative method superior? Or, should both methods be utilized by school systems that can support them?

In this short reaction to Dr. Leyton's presentation, questions have been posed that need answering as a search is made for improvement in our approaches to vocational education. Let us take the best we have learned from applying the underlying principles of vocational education as revealed from our experiences of the past and revise and supplement our curricula of the future on the basis of valid experimentation, research, and evaluation.

[1]Prosser, Charles A. and Thomas H. Quigley. Vocational Education in a Democracy. Chicago: American Technical Society, 1949.

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Criterion Problems in Curriculum Research: A Reaction

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Professor Leton's paper has placed me in a difficult dilemma. I agree heartily, vehemently, and with more than a little passion with his deliniation of the problem confronting work in curriculum research. I find, however, his suggested solution to be characterized by many of the same conditions and problems that he points out as existing in the difficult problem of obtaining curricular change.

Let me illustrate this contention. Professor Leton rightly points to the difficulty of evaluating a closed system and to the necessity of obtaining data from outside that system to evaluate the behaviors within the system he describes. In doing this our friend establishes a new closed system. On page four he has indicated that and I quote "in order for educational researcch to qualify as research, it requires that a theory may be either refuted or confirmed." Immediately he has created a closed system by which educational research or "true research" is defined. We are left with the alternative of accepting that system or we may choose to define research quite differently. We may argue that the development, the description, or the deduction of new information or new bits of data is that which characterizes research and that indeed, research so narrowly defined as the confirmation or refutation of a theoretical position severely limits, if not almost destroys, the possibility of substantial advances in the area of research in curriculum whether it be in vocational education or in the preparation of educational researchers. I would wonder if the Harvard psychologist, B. F. Skinner, could be considered aresearcher. I certainly would consider him so and yet Skinner has strongly maintained for a number of years that he is atheoretical in approach. In fact,

Skinner has maintained in his book Cumulative Record that the researcher is the one who is willing to drop or abandon a theoretical position to pursue an interesting piece of behavior in whatever direction it might lead him. It has become indeed fashionable for educational psychologists, to imitate the experimental psychologist (as the experimental psychologist imitate the behavior of physicists of a decade ago) in demanding theoretical propositions which would lead to testable hypotheses which would in turn lead to conclusions about behavior. Marvin Dunnette in a very recent paper in the American Psychologist has labeled such theory building as fashion and folderol in Psychology and, in Dunnette's words,

> "Fashions--those manners or modes of action taking on the character of habits and enforced by social or scientific norms defining what constitutes the "thing to do"--included theorizing and theory building, criterion fixation, model building, null hypothesis testing, sensitivity training, being productive at work, developing authentic relationships, devising "cute" experiments, simulation, using "elegant" statistics, and so on.
>
> Folderol--those practices characterized by excessive ornamentation, nonsensical and unnecessary actions, trifles and essentially useless and wasteful fiddle-faddle--included tendencies to be fixated on theories, methods, and points of view, conducting "little" studies with great precision, attaching dramatic but unnecessary trappings to experiments, asking unimportant or irrelevant questions, grantsmanship, coining new names for old concepts, fixation on methods and apparatus, seeking to "prove" rather than "test" theories, and myriad other methodological ceremonies conducted in the name of rigorous research."

An example of this particular form of behavior certainly includes the fixation on highly complex statistical analyses including variance, discriminant, canonical, and factor and the application of such operations to data frequently not worth the scouting which is employed. Inevitably, this does lead to the plethora of publications and papers referred to quite caustically and with cause by Professor Leton. Such verbal fecundity defies the capacity of any individual or even research institute to comprehend them.

It is worth noting at this point that many of the publications which appear in such journals as the Journal of Experimental Psychology, the Journal of Applied Psychology, the Journal of Personality and Social Psychology, and the Journal of Abnormal and Social Psychology are, for the most part rigorously designed, if dealing with amazingly inconsequential pieces of behavior. The conclusions the naive reader would draw from reading articles from these journals is that psychology has made numerous and important advances. This reader could not help but be impressed as he scans complex analysis of variance designs liberally dotted with one, two, or with a blessed smile three asterisks, indicating indeed significance has been obtained. The sophisticated reader is perhaps somewhat disturbed when he examines the magnitude of the relationship between the independent and dependent variables so investigated. In a recent investigation by Milton Hackel (1966) studies in these journals were randomly selected and the F ratios and T tests were converted to correlation ratios etas in attempt to estimate the degree of association between the independent and dependent variables. Of the total 112 correlations ratios formed over one-third failed to reach .30, with the median value of all 112 being only .42. It is disturbing to the sober-minded investigator to consider that conclusions based on etas of this value are based on less than nine percent of the variance in the criterion being accounted for by variance in the independent variables. It appears that this current concern with sophistication in statistical methodology is leading to an obsessive interest in numbers and, unfortunately, a lack of consideration about the questions that are being asked.

I would contend that we are far from the point of theoretical testing and formulation in the area of curriculum research that is a late stage in any science. We are, at present, far from being able to state with any precision the objectives we are attempting to achieve

nor have we attempted to validate these objectives in the lives of these individuals with whom we are attempting to work. The pressures for publication and time limited grants have given rise to a vast array of "little" studies so appropriately and accurately castigated by Professor Leton. Such studies as two minute exercises in key pressing or brief verbal responses are not likely to help us much in attempting to improve curricula practices and methodology. Design and methodological consideration should await the formulation of meaningful questions which can best be ascertained by more thoughtful inquiries into the nature and aspects of our goals and objectives. The theorists frequently counter such arguments by saying, "but look what interesting conclusions and observations my theoretical conceptualization has led us to." One may also counter that argument by considering what interesting questions and conclusions that conceptualization has perhaps led us from.

I cannot avoid commenting on what I consider a serious omission from Professor Leton's presentation. He discusses, in sone detail, many of the problems connected with educing information about important relevant interactions between kinds of students and types of curricula approaches. I must express my strong belief that the function of the teacher as an intervening variable between curriculum and the student is crucial for the progress of improvement in curricula research. For instance, there is little doubt that various kinds of audiovisual aids are extremely effective in improving or accelerating the amount of learning students may experience. There is also little doubt that some teachers do not function well utilizing some of these media and, in fact, their performance may, in fact, suffer. I argue that the neglect of the teacher variable in curriculum research is a crucial problem and one which is not being attacked. As Professor Leton himself pointed out in his study with Buswell that the theoretical approaches employed were apparently filtered out in the teacher's system, and the

source of variation attributed to teachers was therefore far greater than the source of variation attributed to either theoretical position understudy. Perhaps this might indicate that an important area of study should be the characteristics and practices of successful, vocational educators as defined by logically relevant criteria may have greater potential for advancement in the long run than the examination of various theoretical approaches to the presentation of learning materials.

This preoccupation with theory is, at present, a possible stumbling block in the advancement of the practice of vocational education. The preoccupation with theory that is presently noted in the U.S. Office of Vocational Education Research Division is well known. Sociological and psychological conceptions are far more likely to receive support than are more pragmatic, and possibly more revealing in the long run, projects. Science does not advance by proof; science advances only by disproof by rejecting contentions, not by proving contentions. Theoretical conceptualizations, unfortunately, are far more apt to possess higher amounts of ego involvement and possibly be more subject to confirmation by subjective arithmetic than perhaps a more anthropological approach to the phenomenal we are investigating. I would argue that perhaps a more viable model at present would be that which has been described as multiple-hypothesis testing. We would start by observing the behavior of concern and devising a series of multi or competing hypotheses which would either explain or fail to explain the observed behavior through experiments designed to eliminate completing hypothesis until only those which we fail to refute remain. In this way we may make greater progress than by starting with a single unitary hypothesis with which too many studies begin. This is not a new idea in research; it has been called the process of converging operations, and it is however, an extremely difficult idea to implement.

It has the advantage, however, of not binding the investigator(s) to a tunneltype perception of the world. Curricula research is not at the theoretically formulated hypothesis testing stage. We need more longitudinal, descriptive studies, what happens to different kinds of people when exposed to different kinds of experiences and who move to different kinds of settings rather than rather elaborately controlled and sophisticated studies teasing out small differences in variation of behavior.

As a final comment, perhaps our friends, Flo's, rut might have some values. As Professor Leton himself points out, wholesale changes in curriculum practices based upon little studies with insignificant strength association between dependent and independent variables along as with such fads as programmed learning, multi-media laboratories and other "exciting approaches to curriculum innovation" has some social significance. Scientific propensity to parsimony is perhaps resisted by the unparsimonius condition of nature that we confront. Why use Ocam's razor when we are trying to hack away at a jungle? The principle of reductionalism to which Professor Leton refers us perhaps is reflected more in our need to be scientific than in the nature of the phenomena we are attempting to observe.

I certainly hope that my remarks will be construed as an attempt to present another side of the issue to which both Professor Leton and I have addressed ourselves. I cannot argue that "I am right." I can maintain that there is more than one position upon which we might choose to operate.